# Wyoming's Oil and Gas Resources

## Summary Report

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Editing and layout by Chamois Andersen


## Introduction

Wyoming is rich in oil and gas resources. The state currently ranks third in the nation in the production of natural gas and eighth in crude oil production. Wyoming hosts some of the largest oil and gas fields in the nation, including Jonah, Pinedale, Madden, and coalbed natural gas in the Powder River Basin (PRB).

Wyoming's vast oil and gas resources are due to the state's geologic history. The bulk of the oil and gas, found deep in the state's basins, began as organic-rich shales deposited in the shallow Permian seas of the Phosphoria Formation (278–253 million years ago) or the Cretaceous western interior seaway (124–65 million years ago). Subsequent burial and increased pressures and temperatures allowed the organic material to mature into hydrocarbons, which migrated and were ultimately trapped in various locations in the basins throughout the state. These traps are Wyoming's oil and gas fields.

## Wyoming Oil Production

Oil has been an important resource in Wyoming since before statehood. The first oil well in the state was drilled in 1884, southwest of Lander. Since 1978, when oil production records were first required by the state, Wyoming has produced nearly 3 billion barrels of oil.

The nearly 130-year history of oil exploration and production in Wyoming has taken its toll on the state's traditional oil reservoirs. By and large, the easily detected and easily produced oil in the state has been played out, which is why oil production steadily declined from the 1970s through the early 2000s (Figure 1).

Since 2002, annual oil production has been between 51 and 55 million barrels. Production in 2011 was more than 54 million barrels of oil, from 879 fields. This represents nearly 3 percent of total U.S. crude oil production.

Wyoming's current and relatively steady oil production

> The Wyoming Geological Survey's role in providing knowledge on our oil and natural gas resources will continue to help inform decisions about the future of energy production for our state.
>
> – Tom Drean, Director of the WSGS


WYOMING STATE GEOLOGICAL SURVEY
Thomas A. Drean
Director and State Geologist
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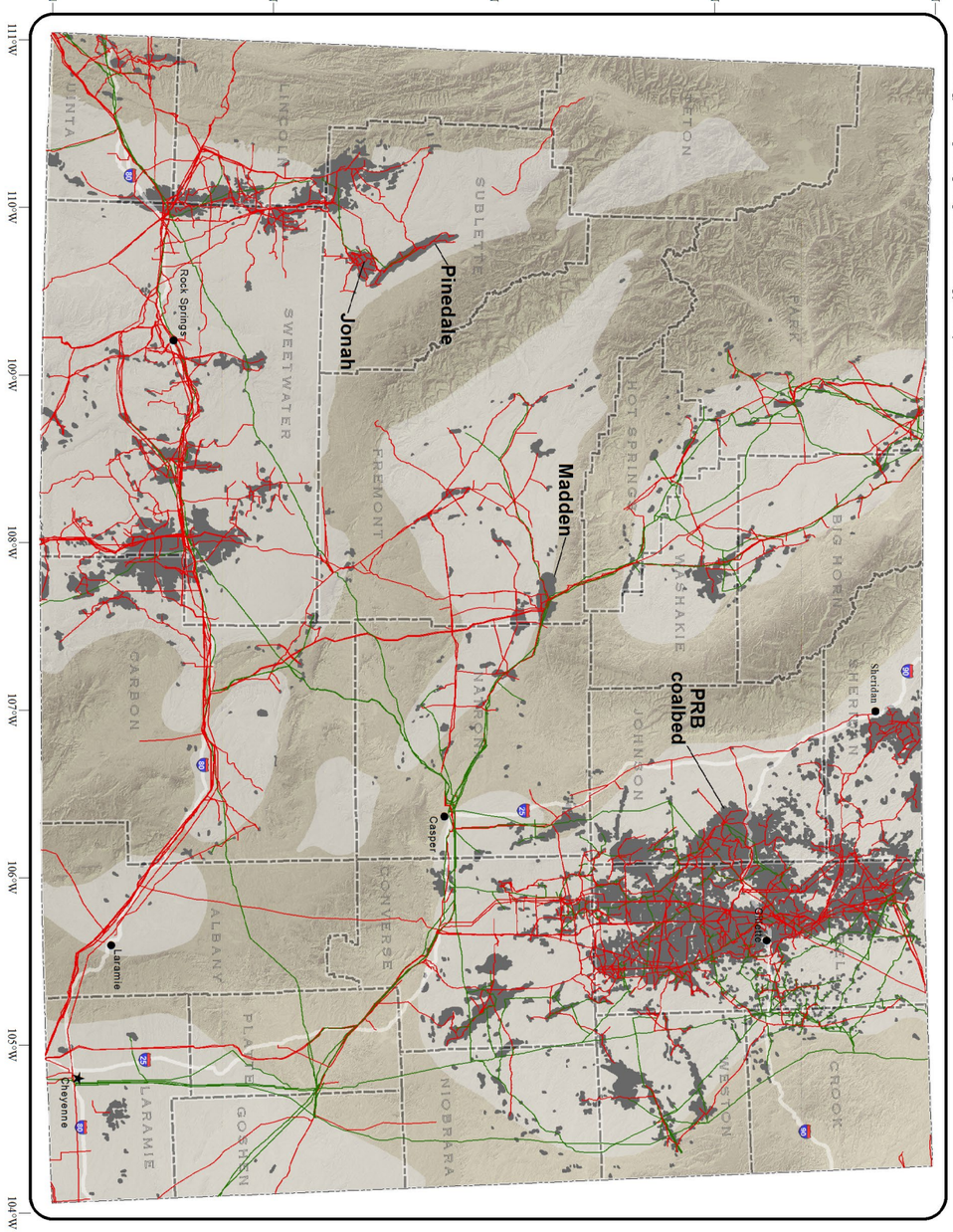
*Geology - Interpreting the past - Providing for the future*





Map design and layout by Phyllis Ranz 2/2013

## 2011 Wyoming Production

- Of 1,522 oil and gas wells drilled in WY, 17 percent were oil and 77 percent were gas
- 10,600+ wells produced oil
- 29,000+ produced gas (15,000 of which were coalbed natural gas wells)
- 14 barrels per day was the average production from an oil well
- 208 thousand cubic feet per day was the average production for a gas well
- 400+ companies produced oil
- 275+ companies produced natural gas
- 49 was the average monthly rig count
- Campbell County was the leading producer of crude oil (followed by Sublette and Park counties)
- Sublette County was the largest natural gas producer (followed by Johnson and Sweetwater counties)

## U.S. Production

- U.S. crude oil production (including lease condensate) averaged almost 6.5 million barrels per day in September 2012, the highest volume in nearly 15 years
- Since September 2011, U.S. oil production has increased by more than 900,000 barrels per day. This is primarily due to horizontal drilling combined with hydraulic fracturing
- In 2011, the United States produced 28,479,026 million cubic feet of gas from 514,637 gas wells
- Natural gas was supplied to 65,938,523 residential U.S. consumers in 2011
- In 2012, the lower 48 states had the capacity to process 64,661 million cubic feet of gas per day

is due to natural gas related liquids, new unconventional plays, and better recovery technology. One form of improved recovery technology is known as enhanced oil recovery, or EOR. Enhanced oil recovery techniques vary, but generally EOR increases reservoir pressure by injecting materials (such as carbon dioxide) into a declining oil reservoir. Additional oil can be produced that would otherwise be bypassed by traditional recovery methods.

Improved technology has also helped in recovering oil from unconventional reservoirs. The oil industry and Wyoming Legislature have invested in research to advance technology for unconventional oil sources, which includes horizontal drilling and staged hydraulic fracturing. Geology is a science critical to predicting and characterizing new unconventional oil and gas reservoirs, and the Wyoming Geological Survey will continue to play a key role in these efforts.

These investments are crucial to the future of Wyoming oil production because of the increasing scarcity of conventional reserves. Unconventional reservoirs are not a typical porous sandstone or fractured limestone. Instead, these reservoirs produce oil from rocks that have extremely low permeabilities. New technology will continue to make production from these unconventional reservoirs possible.

## Wyoming Natural Gas Production

Natural gas production in Wyoming primarily occurs from conventional and tight gas sand gas reservoirs in the Greater Green River Basin and unconventional (coalbed natural gas) reservoirs in the Powder River Basin. Over the past few decades gas production in Wyoming has steadily increased. In 2009, however, as a result of a decline in natural gas prices worldwide and maturing fields, production began to slow. In 2011, the state reported a decrease in gas production and preliminary numbers for 2012 suggest this trend will continue (Figure 1).

Wyoming gas accounts for 10 percent of U.S. natural gas production. In 2011, the state produced more than 2.37 trillion cubic feet of natural gas, with 20 percent (480 billion cubic feet) from coal beds in the Powder River Basin. In 2011, the United States consumed approximately 24.4 trillion cubic feet of natural gas for such uses as electricity, industrial, residential, and commercial, as well as for natural-gas vehicles.

## Future Scenarios

Wyoming will continue to be a national leader in oil and gas production with its many existing and new opportunities. Estimates for 2012 production are 57.6 million barrels of oil and 2.2 trillion cubic feet of gas. Wyoming will also continue to be a leader in advancing technology for unconventional oil recovery. Wyoming is fortunate to have vast oil and natural gas deposits. Wyoming also benefits from being ideally located at the crossroads for Canadian crude-oil imports, as well as serving as a byway for Rocky Mountain production flowing to U.S. markets.

Although forecasting production is not an exact science, there are some important past and current trends to consider for the future. Most notably, gas production has declined since 2009 (Figure 1). This decline is expected to continue as natural gas prices remain low. If natural gas prices rise, increases in production could lag behind for a year or more, due to budgeting, permitting, and the technical aspects of drilling and bringing a well online. As a result, in the next few years the WSGS believes that natural gas production in Wyoming will remain below the record high of 2.54 trillion cubic feet in 2009.

In the near future the forecast for Wyoming's petroleum production is more optimistic. Unconventional oil reservoirs in the Powder River Basin may help steady or even increase oil production in the coming years. In particular, Converse County has experienced a rapid increase in oil well permits in the last three years, and in 2012 recorded five times the permits than in 2010. While the full potential of these reservoirs has yet to be realized, they will likely drive new well permitting and drilling in Wyoming.

## Wyoming Oil and Gas Production

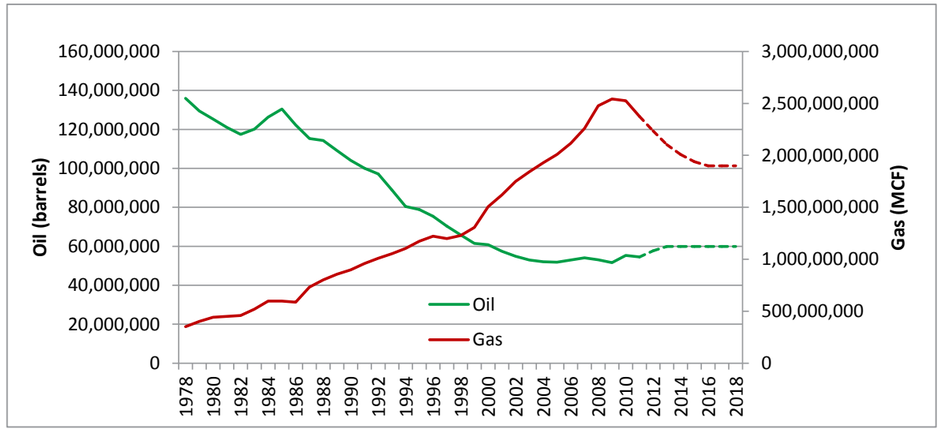



**Figure 1.** Oil and gas production for Wyoming from 1978 through 2011 (WOGCC, 2012). Production estimates for 2012 through 2018 are shown as dashed lines.

## 2011 Wyoming Taxes and Labor

- Oil and natural gas production paid more than $633 million in severance taxes in 2011 (65% of all severance taxes paid by Wyoming minerals produced)
- 26,000 jobs were supported by the oil and gas industry
- $2.1 billion was contributed to Wyoming's labor income
- $2.4 billion was contributed to Wyoming's economy

## Sources

U.S. Energy Information Administration
Wyoming Oil and Gas Conservation Commission

For additional information, click this QR code to access the WSGS oil and gas website.

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